

CLAIMS

What is claimed is:

1. A method of managing defects on a recording medium, the recording medium including a plurality of temporary defect management areas for managing defects detected on the recording medium, the method comprising:

performing defect management using the plurality of temporary defect management areas; and

writing full flag information indicating that one temporary defect management area, of the plurality of temporary defect management areas, is exhausted to at least one of the remaining plurality of temporary defect management areas when the one temporary defect management area is exhausted.

2. The method of claim 1, wherein the recording medium further comprises a defect management area, separate from the temporary defect management areas, for defect management during playback of the recording medium.

3. The method of claim 1, further comprising performing the defect management using the remaining temporary defect management areas, without the one temporary defect management area that is exhausted, when the at least one of the remaining plurality of temporary defect management areas includes the full flag information.

4. The method of claim 1, further comprising:
disposing at least one of the plurality of temporary defect management areas in at least one of a lead-in area, a lead-out area, and an outer area of the recording medium; and
disposing at least one of the plurality of temporary defect management areas in a data area of the recording medium.

5. The method of claim 4, wherein the writing of the full flag information comprises writing full flag information, indicating that the one temporary defect management area is exhausted, to the one of the remaining plurality of temporary defect management areas disposed in the data area when the one temporary defect management area disposed in at least one of the lead-in area, the lead-out area, and the outer area is exhausted.

6. The method of claim 4, wherein the writing of the full flag information comprises writing full flag information indicating, that the one temporary defect management area is exhausted, to the one of the remaining plurality of temporary defect management areas disposed in at least one of the lead-in area, the lead-out area, and the outer area when the one temporary defect management area disposed in the data area is exhausted.

7. The method of claim 1, wherein temporary defect information, including information of detected defects, is recorded in temporary defect management areas in a reverse sequencing from a rear of each respective temporary defect management area to a front of each respective temporary defect management area.

8. A method of managing defects on a recording medium having a single recording layer on which a lead-in area, a data area, and a lead-out area are sequentially disposed, the data area having a first spare area and a second spare area at the respective opposite ends thereof, the method comprising:

allocating a first temporary defect management area to at least one of the lead-in area and the lead-out area of the recording medium;

allocating a second temporary defect management area between the first spare area and a user data area or between the user data area and the second spare area;

performing defect management for the recording medium using the first and second temporary defect management areas; and

writing full flag information, indicating that one of the first and second temporary defect management areas is exhausted, to the other one of the first and second temporary defect management areas, when the one of the first and second temporary defect management areas is exhausted.

9. The method of claim 8, further comprising performing the defect management using the other one of the first and second temporary defect management areas, without the one of the first and second temporary defect management areas that is exhausted, when the other one of the first and second temporary defect management areas includes the full flag information.

10. The method of claim 8, wherein the performing of the defect management comprises:

updating temporary management information in the second temporary defect management area whenever a predetermined number of clusters in the user data area are filled or whenever a verify-after-write operation, on the recording medium, is completed a predetermined number of times; and

updating temporary management information in the first temporary defect management area whenever a recording operation is completed,

wherein the updating of temporary management information in the first temporary defect management area occurs according to a period different from the updating of the temporary management information in the second temporary defect management area.

11. The method of claim 8, wherein the performing of the defect management comprises writing the most update temporary management information in the first or second temporary defect management area to a defect management area provided in at least one of the lead-in area and the lead-out area of the recording medium, with the defect management area being used for defect management during playback of the recording medium.

12. The method of claim 8, further comprising recording temporary defect information, including information of detected defects, in the first and/or second temporary defect management areas in a reverse sequencing from a rear of each respective temporary defect management area to the front of each respective temporary defect management area.

13. A method of managing defects on a recording medium having a first recording layer and a second recording layer, the first recording layer including a lead-in area, a data area, and an outer area which are sequentially disposed according to a recording path wherein the data area of the first recording layer has a first spare area and a second spare area at the respective opposite ends thereof, the second recording layer including an outer area, a data area, and a lead-out area which are sequentially disposed according to the recording path wherein the data area of the second recording layer has a third spare area and a fourth spare area at the respective opposite ends thereof, the method comprising:

allocating a first temporary defect management area to at least one among the lead-in area, the lead-out area, and the outer areas of the recording medium;

allocating a second temporary defect management area between the first spare area and a user data area and/or between the fourth spare area and the user data area;

performing defect management for the recording medium using the first and second temporary defect management areas; and

writing full flag information, indicating that one of the first and second temporary defect management areas is exhausted, to the other one of the first and second temporary defect management areas when the one of the first and second temporary defect management areas is exhausted.

14. The method of claim 13, further comprising performing the defect management using the other one of the first and second temporary defect management areas, without the one of the first and second temporary defect management areas that is exhausted, when the other one of the first and second temporary defect management areas includes the full flag information.

15. The method of claim 13, wherein the performing of the defect management comprises:

updating temporary management information in the second temporary defect management area whenever a predetermined number of clusters in the user data area are filled or whenever a verify-after-write operation, on the recording medium, is completed a predetermined number of times; and

updating temporary management information in the first temporary defect management area whenever a recording operation is completed,

wherein the updating of temporary management information in the first temporary defect management area occurs according to a period different from the updating of the temporary management information in the second temporary defect management area.

16. The method of claim 13, wherein the performing of the defect management comprises writing the most update temporary management information in the first or second temporary defect management area to a defect management area provided in at least one among the lead-in area, the lead-out area, and the outer areas of the recording medium, with the defect management area being used for defect management during playback of the recording medium.

17. The method of claim 13, wherein temporary defect information, including information of detected defects, is recorded in the first and/or second temporary defect management areas in a reverse sequencing from a rear of each respective temporary defect management area to the front of each respective temporary defect management area.

18. A reproducing and/or recording apparatus comprising:
a pickup to write data to or read data from a recording medium; and
a control unit to verify data written to or read from the recording medium by the pickup, perform defect management using a plurality of temporary defect management areas provided on the recording medium, and control the pickup to write full flag information, indicating that one of the plurality of temporary defect management areas is exhausted, to at least one of the remaining temporary defect management areas when the one temporary defect management area is exhausted.

19. The reproducing and/or recording apparatus of claim 18, wherein the control unit controls the pickup to use a defect management area of the recording medium, separate from the temporary defect management areas, for defect management of the recording during playback of the recording medium.

20. The reproducing and/or recording apparatus of claim 19, wherein the defect management area is in a compatible location for rewritable recording media and the recording medium, which is a write-once recording medium.

21. The reproducing and/or recording apparatus of claim 18, wherein the reproducing and/or recording apparatus is compatible with both rewritable recording media and the recording medium, which is a write-once recording medium.

22. The reproducing and/or recording apparatus of claim 18, wherein the control unit performs the defect management using the remaining temporary defect management areas, without the one of the first and second temporary defect management areas that is exhausted, when the at least one remaining temporary defect management area includes the full flag information.

23. The reproducing and/or recording apparatus of claim 18, wherein at least one among the plurality of temporary defect management areas is disposed in at least one of a lead-in area, a lead-out area, and an outer area of the recording medium, and at least one of the remaining plurality of temporary defect management areas is disposed in a data area of the recording medium.

24. The reproducing and/or recording apparatus of claim 23, wherein the control unit controls the pickup to write full flag information, indicating that the one temporary defect management area is exhausted, to the at least one remaining temporary defect management areas disposed in the data area when the one temporary defect management area, disposed in at least one among the lead-in area, the lead-out area, and the outer area, is exhausted.

25. The reproducing and/or recording apparatus of claim 24, wherein the control unit controls the pickup to write full flag information, indicating that the one temporary defect management area is exhausted, to at least one of the remaining temporary defect management areas disposed in at least one of the lead-in area, the lead-out area, and the outer area when the one temporary defect management area disposed in the user data area is exhausted.

26. The reproducing and/or recording apparatus of claim 18, wherein temporary defect information, including information of detected defects, is recorded in temporary defect management areas in a reverse sequencing from a rear of each respective temporary defect management area to the front of each respective temporary defect management area.

27. A write-once recording medium having a single recording layer on which a lead-in area, a data area, and a lead-out area are sequentially disposed, the data area having a first spare area, a user data area, and a second spare area which are sequentially disposed, the write-once recording medium comprising:

a defect management area provided in at least one of the lead-in area and the lead-out area including defect management information for performing defect management of the write-once recording medium during playback;

a first temporary defect management area provided in at least one of the lead-in area and the lead-out area including temporary management information recorded to the write-once recording medium with a predetermined period; and

a second temporary defect management area provided between the first spare area and the user data area or between the user data area and the second spare area including temporary management information recorded to the write-once recording medium with a period different from the predetermined period,

wherein full flag information, indicating whether the second temporary defect management area is exhausted, is recorded in the first temporary defect management area, and full flag information, indicating whether the first temporary defect management area is exhausted, is recorded in the second temporary defect management area.

28. The write-once recording medium of claim 27, wherein the temporary management information in the second temporary defect management area is updated whenever a predetermined number of clusters in the user data area are recorded or whenever a verify-after-write operation, of the write-once recording medium, is completed a predetermined number of times.

29. The write-once recording medium of claim 27, wherein the temporary management information in the first temporary defect management area is updated whenever a recording operation is completed.

30. The write-once recording medium of claim 27, wherein the most update temporary management information in the first or second temporary defect management areas is written to the defect management area when the write-once recording medium is finalized.

31. A write-once recording medium having a first recording layer and a second recording layer, the first recording layer including a lead-in area, a data area, and an outer area which are sequentially disposed according to a recording path and wherein the data area has a first spare area and a second spare area at the respective opposite ends thereof, the second recording layer including an outer area, a data area, and a lead-in area which are sequentially disposed according to the recording path and wherein the data area has a third spare area and a fourth spare area at the respective opposite ends thereof, the write-once recording medium comprising:

- a defect management area provided in at least one of the lead-in area, the lead-out area, and the outer areas, including defect management information;

- a first temporary defect management area provided in at least one of the lead-in area, the lead-out area, and the outer areas, including temporary management information recorded to the write-once recording medium with a predetermined period; and

- a second temporary defect management area provided between the first spare area and the user data area of the first recording layer and/or between the fourth spare area and the user data area of the second recording layer, including temporary management information recorded to the write-once recording medium with a period different from the predetermined period,

- wherein full flag information, indicating whether the second temporary defect management area is exhausted, is recorded in the first temporary defect management area, and full flag information, indicating whether the first temporary defect management area is exhausted, is recorded in the second temporary defect management area.

32. The write-once recording medium of claim 31, wherein the temporary management information in the second temporary defect management area is updated whenever a predetermined number of clusters in a user data area of the write-once recording medium are filled or whenever a verify-after-write operation, for the write-once recording medium, is completed a predetermined number of times.

33. The write-once recording medium of claim 31, wherein the temporary management information in the first temporary defect management area is updated whenever a recording operation of the write-once recording medium is completed.

34. The write-once recording medium of claim 31, wherein the most update temporary management information in the first or second temporary defect management areas is recorded in the defect management area when the write-once recording medium is finalized.

35. A recording medium, comprising:
a defect management area recording defect management information for defect management of user data recorded on the recording medium during playback of the user data; and
a plurality of temporary defect management areas recording temporary management information for defect management, of a user data area, during recording of the user data on the recording medium, and including information on whether one of the plurality of temporary defect management areas has been exhausted, wherein
upon finalization of the recording medium, temporary management information defect information recorded in one of the plurality of temporary defect management areas is recorded in the defect management area as the defect management information.

36. The recording medium of claim 35, wherein the recording of the temporary management information defect information as the defect management information is based on the recorded information on whether one of the plurality of temporary defect management areas has been exhausted.

37. A defect management method, comprising:
recording a plurality of temporary defect management areas including temporary defect information for defect management, of a user data area, during recording of user data on the recording medium, and recording information on whether one of the plurality of temporary defect management areas has been exhausted; and
recording one of the plurality of temporary defect management areas in a defect management area of the recording medium, for defect management of user data recorded on the recording medium during playback of the user data.

38. The defect management method of claim 37, wherein the recording of the temporary defect information in the defect management area is based on the recorded information on whether one of the plurality of temporary defect management areas has been exhausted.

39. The defect management method of claim 37, further comprising reproducing the user data from the recording medium based on the defect information recorded in the defect management area, which is based on the temporary defect information recorded in the one temporary defect management area.

40. A medium comprising computer readable code controlling the implementation of the method of claim 37.

41. A medium comprising computer readable code to control the reproducing and/or recording apparatus of claim 18 to perform defect management using a plurality of temporary defect management areas and the recording of the full flag information.

42. A medium comprising computer readable code controlling the implementation of the method of managing defects of claim 1.

43. A medium comprising computer readable code controlling the implementation of the method of managing defects of claim 8.

44. A medium comprising computer readable code controlling the implementation of the method of managing defects of claim 13.